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***Nipponoparmelia perplicata* sp. nov. (Parmeliaceae, Ascomycota)
from eastern Asia**

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ABSTRACT — A new species, *Nipponoparmelia perplicata* described from Korea and Russia, is segregated from *N. laevior*, from which it differs in having shorter and wider lobes that characteristically turn down towards the margins. The pseudocyphellae are inconspicuous, positioned along the lobe margins or on the underside. An improved description of *N. pseudolaevior* is presented, including new data on isidia with illustrations. A key to Korean *Nipponoparmelia* species is provided.

KEY WORDS — taxonomy, thallus morphology, distribution, ecology, secondary lobules

Introduction

The genus *Nipponoparmelia* (Kurok.) K.H. Moon et al. forms a separate main clade in the *Parmeliaceae* (Crespo et al. 2010), which includes a group of East Asian species previously placed in *Parmelia* Ach. s. str. According to Kurokawa (1994), who treated the group as a subgenus of three species within *Parmelia*, they differ morphologically from other *Parmelia* species by forming lateral punctiform pseudocyphellae. The pseudocyphellae resemble those of *Punctelia* Krog and *Flavopunctelia* (Krog) Hale in lacking a persistent epicortex roof and not forming angular or linear pore aggregates (Krog 1982; Hale 1984). However, in *Nipponoparmelia* the pseudocyphellae are marginal on lobes and lobules, not laminal as in *Punctelia* and *Flavopunctelia*. *Parmelia* subg. *Nipponoparmelia* Kurok. was recognized by a grey to grey-brown thallus with marginal punctiform pseudocyphellae and simple to furcate rhizines. Crespo

et al. (2010), who raised the subgenus to generic rank, included four species: *Nipponoparmelia isidioclada* (Vain.) K.H. Moon et al., *N. laevior* (Nyl.) K.H. Moon et al., *N. pseudolaevior*, and *N. ricasolioides* (Nyl.) A. Crespo & Divakar.

We have discovered a new *Nipponoparmelia* species, which we describe here as *N. perplicata*. We also present an improved description of *N. pseudolaevior* and provide a key to Korean *Nipponoparmelia* species.

Taxonomy

Nipponoparmelia perplicata S.Y. Kondr., Tschab., Elix & Hur, **sp. nov.** Figs 1, 2

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Differs from *Nipponoparmelia laevior* by its smaller thalline lobes, helmet-shaped marginal lobes, larger and mainly inconspicuous pseudocyphellae on the upper side, and wider ascospores.

TYPE — South Korea: Mt. Jiri, 35°19'30.0"N 127°42'45.7"E, 1755 m, on bark of *Malus baccata* (L.) Borkh. (*Rosaceae*), 23.iv.2004, J.-S. Hur 040372 (Holotype, KoLRI 001148).

ETYMOLOGY — The species epithet refers to the inconspicuous pseudocyphellae.

Thallus 5–8(–10) cm broad, adnate to loosely adnate, dark greenish, olive-grey to whitish mineral gray; lobes to 4(–7) mm long and 1–2(–3) mm wide, subirregular, somewhat subconvex to convex due to the downwards folded edges, contiguous to subimbricate, non-ascending and non-sinuate, without isidia and soredia, upper surface matt to shiny, rarely foveolate, upper surface mainly entire even on older lobes, pseudocyphellae from punctiform and rounded or elongate to fissure-like to 0.6–1(–1.5) mm in diam., usually inconspicuous, usually marginal but rarely laminal on the underside; medulla white; lower surface black, often with pale or dark brownish marginal zone, moderately to densely rhizinate, the rhizines simple or furcate.

Apothecia sometimes abundant, more or less stipitate, 2–7 mm in diameter, thalline margin more or less foveolate, pseudocyphellae punctiform, highly elevated, pseudocyphellae often present on the inner side of the thalline margin, disc brown, reddish brown to dark brown. Ascospores (10–)13–17 × (7–)8–11(–12) µm.

CHEMISTRY — Thallus K+ yellow becoming brownish, C–, Pd+ yellow; medullar K+ yellow becoming red, C–, Pd+ deep yellow, slowly becoming orange. Atranorin, chloroatranorin, salazinic acid, and traces of consalazinic and protocetraric acid.

ECOLOGY & DISTRIBUTION — On trunk or twigs of trees. Known from scattered localities in South Korea and far eastern Russia.

OTHER SPECIMENS EXAMINED — SOUTH KOREA: JEOLLANAM-DO, Gurye-gun, Jiri Mt., 35°17'49.5"N 127°33'36.2"E, 1281 m, on bark of *Quercus*, 27.ix.2006, J.-S. Hur 20060783 (KoLRI 005162); Mt. Jiri, 35°18'56.0"N 127°41'29.7"E, 1690 m, on bark of *Quercus*, 23.iv.2004, J.-S. Hur 040354 (KoLRI 001130); KANGWON-DO, Shokcho city,

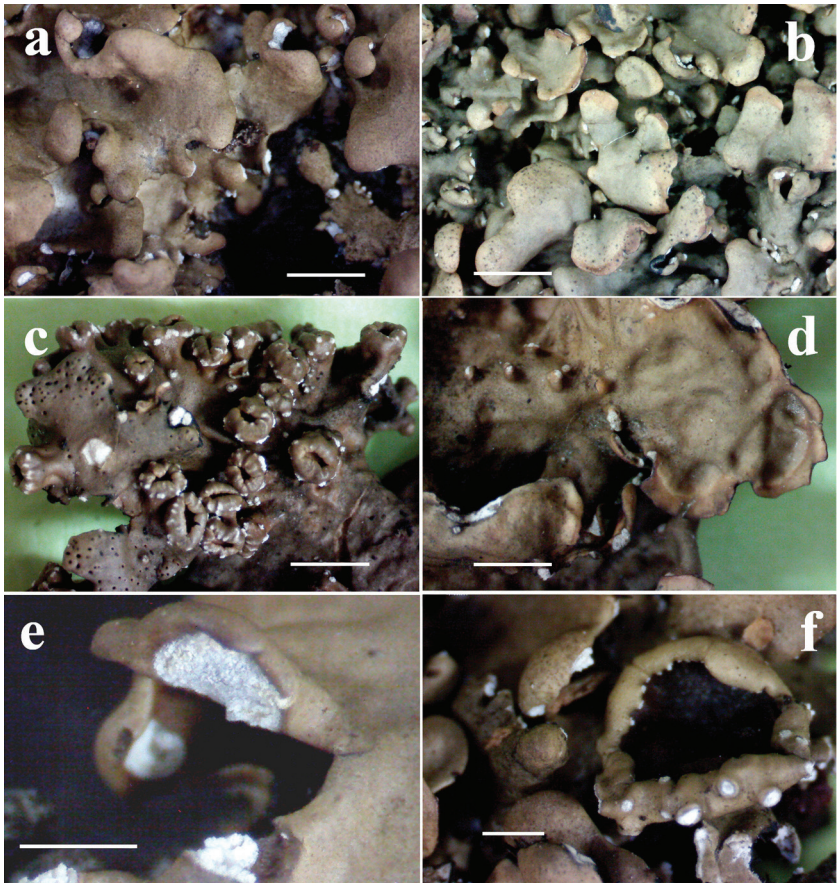


FIG. 1. *Nipponoparmelia perplicata*: general habit. Scale bars: a–d = 2 mm; e–f = 1 mm.

Seorak-dong, Mt. Sorak, 38°09'47.3"N 128°27'32.2"E, 810 m, on bark, 17.vi.2005, J.-S. Hur 050284 (KoLRI 003188); JEOLLABUK-DO, Jeongup-si, Mt. Naejang, 35°28'57.8"N 126°52'59.6"E, 711 m, on bark of *Quercus*, 8.viii.2003, J.-S. Hur 030621 (KoLRI 000428); GYEONGSANGNAM-DO, Hapcheon-gun, Gaya-myeon, Mt. Gaya, 35°49'05.6"N 128°07'33.2"E, 1340 m, on twigs of *Rhododendron*, 5.v.2006, J.-S. Hur 20060152 (KoLRI 004524); GANGWON-DO, Seon-gun, Gohan-eup, Mt. Hambaek, 37°11'47.4"N 128°54'53.6"E, 1355 m, on bark of *Quercus*, 19.vi.2007, J.-S. Hur 070652 (KoLRI 007511), Mt. Hambaek, 37°11'43.0"N 128°54'51.6"E, 1403 m, on bark of *Quercus*, 19.vi.2007, J.-S. Hur 070661 (KoLRI 007534); [Mt. Suk Byeng], 37°34'29.9"N 128°51'21.8"E, 686 m, on bark, growing together with *Flavoparmelia caperata*, 24.v.2008, J.-S. Hur 080187 (KoLRI 008433, sub *Flavoparmelia caperata*); Mt. Deogyo, 35°51'15.8"N 127°44'55.2"E, 1601 m, on bark of *Quercus*, growing together with *Biatora* sp., 10.viii.2006, J.-S. Hur 20060457 (KoLRI 004825). RUSSIA: SHIKOTAN ISLAND, near mountain Notoro, on

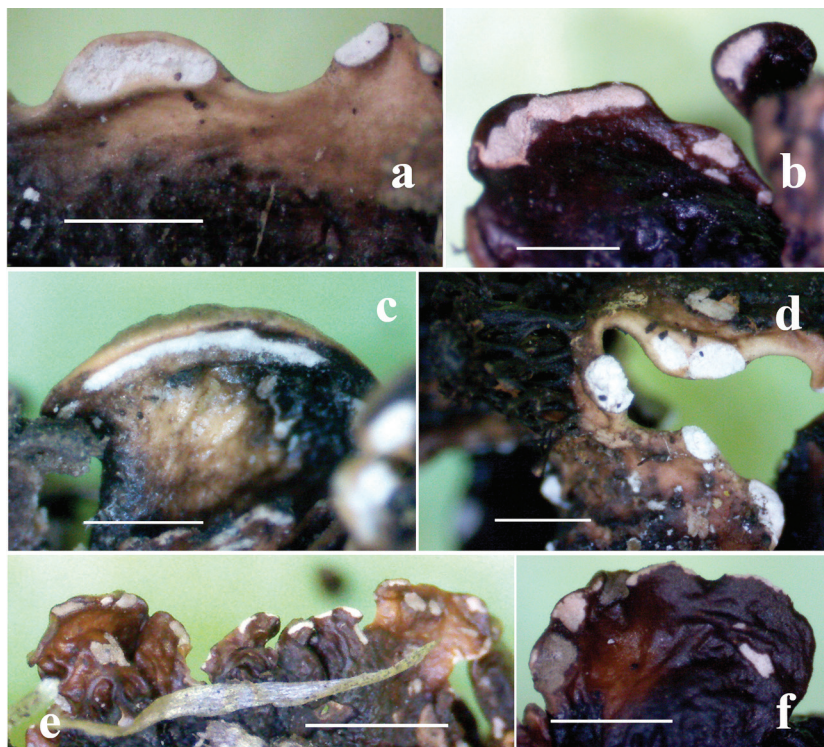


FIG. 2. *Nipponoparmelia perplicata*: general view of pseudocyphellae on underside.
Scale bars: a–d, f = 1 mm; e = 2 mm.

Betula ermanii, 43°47'21.1"N 146°42'26.7"E, 229 m alt., 14.viii.2010, S. Tschabanenko (SAKH).

TAXONOMIC NOTES — *Nipponoparmelia perplicata* is distinguished from the four other *Nipponoparmelia* species by the irregular lobes with the characteristically down-turned lobe ends that produce a helmet-shaped impression. The pseudocyphellae of *N. perplicata* are inconspicuous, seen mainly on the underside where they are marginally (rarely laminally) positioned, and the lack of marginal lobules and isidia.

Nipponoparmelia isidioclada is densely supplied with branched cylindrical, slightly dorsiventral, eventually 1 mm high coralloid–isidioid structures. It further differs from *N. perplicata* by smaller pseudocyphellae and presence of gyrophoric and 4-O-methylgyrophoric acids (Park 1990; Kurokawa 1994).

Nipponoparmelia laevior, one of the commonest lichens in montane and subalpine areas in Japan and Korea, is characterized by marginal punctiform pseudocyphellae, a shiny and smooth upper surface, and simple to furcate

rhizines and sublinear lobes with distinctly ascending edges. Furthermore, the ascospores of *N. laevior* are $12\text{--}16 \times 6\text{--}9\ \mu\text{m}$, slightly narrower than those of *N. perplicata* (Park 1990; Kurokawa 1994).

Nipponoparmelia pseudolaevior differs from *N. perplicata* by numerous subascending to suberect isidia along the margin and on the surface of the lobes (Park 1990; Kurokawa 1994).

Similar to *N. perplicata*, *Cetreliaopsis asahinae* (M. Satō) Randlane & A. Thell possesses pseudocyphellae on the underside. However, *C. asahinae* also produces conspicuous pseudocyphellae on the upperside (Randlane & Thell 1995). The lobes of *N. perplicata* are smaller and much more closely attached and the lower surface is smoother. Furthermore, *C. asahinae* is usually supplied with marginal apothecia and the secondary chemistry is characterized by fumarprotocetraric acid.

Nipponoparmelia pseudolaevior (Asahina) K.H. Moon, Y. Ohmura & Kashiw.,
in Crespo et al., Taxon 59(6): 1749 (2010).

FIG. 3

Thallus to 10 cm across, adnate or subadnate, dull brownish or dull greenish grey; lobes subirregular, continuous or more or less divaricate, 1–3 mm wide, with more or less ascending margins, upper surface shiny and smooth towards the tips and matt and somewhat wrinkled in the centre, usually with numerous laminal secondary lobules and numerous finger like to cylindrical isidia in the centre of thallus; rarely secondary lobules and isidia with white pruinae in places, pseudocyphellae rather small and inconspicuous, 0.1–0.2(–0.3) mm in diam./across, mainly along the margins, sometimes becoming isidiate (not becoming granular and not giving rise to coralloid-isidioid growths). Secondary lobules 1–2.5(–3) mm wide/across, from rounded to irregular, with distinctly attenuated basis, laminal. Isidia 0.7–1.5(–2) mm long, finger-like to cylindrical, 0.1–0.3 mm wide, scarcely branched, usually numerous along the edges of the main lobes and the edges of the secondary lobules, especially abundant in the centre of the thallus (not being apically crumbling and subsorediate with age). Upper surface shiny, pruinose in parts, plane to slightly wrinkled, lobe edges pseudocyphellate; pores more or less punctuate. Medulla white. Lower surface black, often with a pale or brownish narrow peripheral zone, moderately to densely rhizinate, the rhizines simple or furcated, to 1.5(–2) mm long. Apothecia rare, more or less stipitate, 1–8(–11) mm diam., dentate or lobate along the margin, amphithecium smooth, pseudocyphellate, pseudocyphellae punctuate, more or less elevated, disc buff brown, radially split with age, spores $10\text{--}12 \times 15\text{--}17\ \mu\text{m}$. Pycnidia common, submarginal.

CHEMISTRY — Thallus K+ yellow, C–, KC–, P+ yellow; medulla K+ yellow, becoming red or brown, C–, P+ deep yellow, than slowly becoming orange. Atranorin, chloratranorin, and salazinic acid; consalazinic acid, a fatty acid and protocetraric acid as accessories.

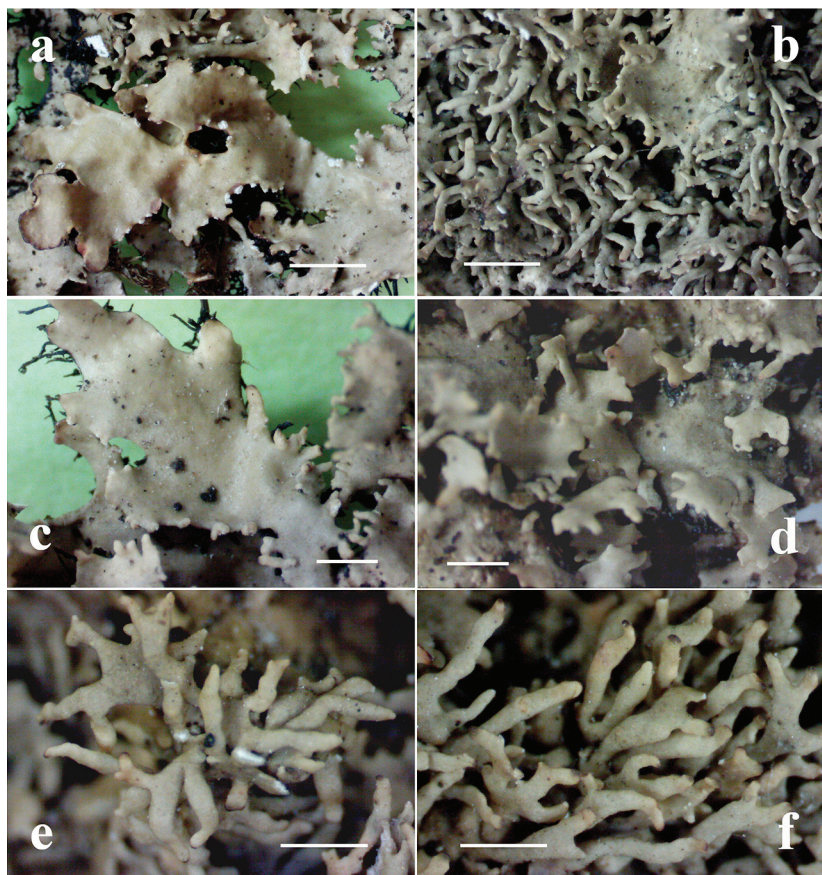


FIG. 3. *Nipponoparmelia pseudolaevior*: A. general habit; B. central portion of thallus; C. lobe; D, laminal lobules; E–F. isidia. Scale bars: A, B = 2 mm; C–F = 1 mm.

SPECIMENS EXAMINED — SOUTH KOREA: Mt. Taebaek, 1016 m alt, on rock, 2.xi.2003, J.-S. Hur 030888 (KoLRI 000678); Mt. Baegun, 1105 m alt, 5.v.2003, J.-S. Hur 030188 (KoLRI 000143). RUSSIA: SAKHALIN ISLAND, Kholmsky district, Slepikovsky cape, 47°17'59.33"N 141°59'37.7"E, mix forest (*Abies* + *Quercus* + *Sorbus*), on *Quercus crispula*, 2006, S. Tschabanenko (SAKH); Ulegorsky district, Bolshoi Nadya River, 49°00'54.06"N 142°15'13.01"E, mix forest, on *Sorbus commixta*, 2003, S. Tschabanenko (SAKH); SHIKOTAN ISLAND, 43°47'21.1"N 146°42'26.7"E, mix forest, Gorobets River, on *Alnus hirsuta*, 14.viii.2010, S. Tschabanenko (SAKH); ITURUP ISLAND, near Lesozavodskoye, mix forest, on *Padus ssiori* [date and collector unrecorded] (SAKH); PRYMORSKY KRAI, Lazovsky district, valley Proselochneya River, 43°00'48.81"N 134°07'00.58"E, deciduous–coniferous forest, on *Quercus mongolica* and *Alnus japonica*, 1985, S. Tschabanenko (SAKH); Lazovsky district, valley Valunovka River, 43°08'45.37"N 133°48'25.75"E, deciduous–coniferous forest, on *Quercus mongolica*, 1986, S. Tschabanenko (SAKH); Lazovsky district, *Quercus* forest near maritime coast

(Zapovednoye village), 42°50'25.74"N 133°42'02.6"E, on *Quercus mongolica* and *Q. dentata*, 1985, S. Tschabanenko (SAKH); Lazovsky district, *Quercus* forest near maritime coast Krasnyi Olenovod, 42°52'19.1"N 133°46'51.46"E, on *Quercus mongolica* and *Q. dentata*, 1985, S. Tschabanenko (SAKH); Ussurijsky district, Zharikov Stream, deciduous–coniferous forest, on *Alnus hirsuta*, [date unrecorded] S. Skirina (SAKH); Khasansky district, valley Kedrovaya River, 43°06'10.64"N 131°31'48.75"E deciduous–deciduous forest, on *Quercus mongolica*, [date unmentioned], S. Skirina (SAKH); KHABAROVSKY KRAI, valley Gorin River, mix forest, on *Quercus mongolica*, [date unrecorded], A. Mikulin (SAKH).

ECOLOGY & DISTRIBUTION— On bark of *Cryptomeria japonica* and various deciduous trees, rarely on *Tsuga diversifolia*, *Abies veitchii*, and *A. sachalinensis* and on rocks, growing sometimes together with *Menegazzia subsimilis* and *Parmelia* and *Lepraria* species. Known from eastern Asia (Japan, South Korea, far eastern Russia). Known in South Korea only from two localities, Mt. Taebaek and Mt. Baegun.

TAXONOMIC NOTES — *Nipponoparmelia pseudolaevior* is closely related to *N. laevior*, from which it is clearly distinguished by the numerous subascending to suberect isidia formed on the margin and less commonly present on the surface of lobes. It is apparently the isidiate morphotype of *N. laevior*, which has a similar distribution range in eastern Asia.

Nipponoparmelia pseudolaevior differs from *N. isidioclada*, a mainly epiphytic species known from Russian Far East, Japan, and Taiwan, by presence of secondary lobules and larger pseudocyphellae, longer isidia, and absence of gyrophoric acid.

Some Korean specimens of *N. pseudolaevior* were previously misidentified as *Punctelia rudecta* (Ach.) Krog, from which it differs in having only marginal punctiform pseudocyphellae, laminal secondary lobes with numerous marginal isidia and a black underside.

In contrast to Russian literature (Rassadina 1971), true isidia were not mentioned for *N. pseudolaevior* in Korean and Japanese keys, being categorized as secondary lobules (Park 1993; Kurokava 1994). However, isidiate material from South Korea and Russia does represent *N. pseudolaevior*.

Key to Eastern Asian *Nipponoparmelia* species

1. Thallus isidiate, with coralloid-isidioid growths or with dense suberect, marginal cylindrical isidia 2
1. Isidia absent 3
2. Isidia apically crumbling and subsorediate; pseudocyphellae becoming granular-isidiate and giving rise to coralloid-isidioid growths to 1 mm high *Nipponoparmelia isidioclada*
2. Isidia not sorediate, regularly cylindrical, dense and suberect along edges of lobules. *Nipponoparmelia pseudolaevior*

3. Lobes sublinear, with ascending margins; pseudocyphellae well distinct, conspicuous from upper surface. *Nipponoparmelia laevior*
3. Lobes irregular, margin folded downwards; pseudocyphellae indistinct, better seen from underside *Nipponoparmelia perplicata*

The status of *N. laevior* specimens with secondary lobules but without isidia will be investigated in the future.

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